

REMARKS

I. Summary of Claim Status:

Claims 16-35 and 38-39 are all the claims pending in the application. Applicants cancel claims 36 and 37 by way of this Amendment.

Applicants thank the Examiner for indicating that claims 25-27 are allowed. These claims are amended to clarify the language therein, while maintaining their patentable scope. Moreover, it is noted that claims 26 and 27 depend from claim 24 and thus, should be objected to.

Claims 23 and 31 have been indicated as objected to, but contain patentable subject matter.

Claims 16-22, 24, 28-30 and 32-39 presently stand rejected.

II. Prior Art Rejections

Claim 24 is rejected under 35 U.S.C. § 102(a) as being anticipated by the applicant cited prior art.

Claims 16-18, 19, 20, 21, 22, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38 and 39 are rejected under 35 U.S.C. § 103(a) as being unpatentable over applicant admitted prior art in view of Lagergren (4,732,035) in view of Maresca (5,950,487).

Analysis

Of the rejected pending claims, only claims 16, 24, 28, 38 and 39 are in independent form; therefore, the following discussion is initially directed to these independent claims.

Claim 16

Claim 16 includes (A) a flow rate measuring portion (13, 33) of the leak detector (11) being provided near a bottom end of the leak detector; (B) a bottom end of the leak detector (11) being detachably attached to the bottom plate (4) of the tank; and (C) an upper end of the leak detector (11) being so supported as to be movable relatively to the top plate in a direction substantially perpendicular to a surface of the liquid, which prevent the leak detector (11) from being moved vertically by a distortion of the top plate (2) or the side plate (3) or keep constant the height of the flow-rate measuring unit 13 with respect to the bottom plate (4) even if the top plate 2 and/or side plate (3) is distorted with a variation of the environmental temperature, holding down false leakage detection and other forms of erroneous recognition due to the variation of the height of the flow-rate measuring unit (3) with respect to the bottom plate (4) (page 36, line 22 to page 37, line 4).

The admitted prior art fails to teach or suggest this capability of preventing false leak detection and other forms of erroneous recognition due to the variation of the height of the flow-rate measuring portion as provided in the novel present invention. Specifically, the admitted prior art fails to disclose at least (A) a bottom attaching portion provided at the bottom end of the leak detector to detachably attach the bottom end to the bottom plate; and (B) a top assembly, attached to the top plate so as to cover an opening provided in the top plate and having a through opening through which an upper end of the leak detector is supported in such a manner that the upper end of the leak detector is movable relatively to the top plate in a direction substantially perpendicular to a surface of the liquid while the bottom end of the leak detector is detachably attached to the bottom plate.

Thus, in the present invention while the bottom end of the lead detector is detachably attached to the bottom plate, the upper end of the leak detector is movable relative to the top plate. This simultaneous structural configuration allows for the height of the flow-rate measuring unit with respect to the bottom plate of the tank to be kept constant even when in the presence of distortions of the top plate or the side plate (due to variations of the ambient temperature), which makes it possible to prevent a pseudo flow of liquid caused by a change in the height of the flow-rate measuring unit from being measured as a non-zero flow (see page 37, line 22, for example).

As noted by the Examiner, the bottom end of the tube in Lagergren is not detachably attached to the base (see Office Action at page 4, penultimate and ultimate lines). Rather, Lagergren merely discloses that the bottom portion of the tube rests on the bottom of the tank.

On the other hand, the Examiner maintains that the top end is movable relative to the top plate because “column 4 describes the tube as being supported in a temporary fashion”. However, Lagergren is silent as to having this movable feature, and moreover, the so-called “temporary fashion” merely describes the permanency of mounting the supporting the tube 24 in the tank; that is, the tube is supported substantially “by the vertical riser 16 or some other temporary **or permanent means** located in the tank.” Therefore, Lagergren does not teach that the top end should be movable relative to the top plate, but instead, that the tube can be removed or permanently placed, but does not imply that the supporting means allows the top end to be movable relative to the top plate while the bottom end would be attached.

It is noted that there is no mention of movability of the tube relatively to the top plate. The reference is completely silent with respect to such a feature. Moreover, even if this feature

were considered to be implied in the reference, there is no motivation for modifying the admitted prior art to have the top end with a movable structural configuration while the bottom end is attached.

The Examiner relies on Maresca for having the bottom end detachably attached.

However, there is no teaching or suggestion for having a tube with a bottom and a top end having the configuration of the present invention. That is, the present invention provides for the bottom of the leak detector to be attached to the bottom plate simultaneously while the top is relatively movable with respect to the top plate. This dual configuration allows for the fluctuations in the tank structure. The combination of these structural features is missing from the combination of cited references.

The prior art rejection picks and chooses certain features from the various pieces of cited prior art to arrive at the claimed invention, however, the claimed invention as a whole would not have been obvious. To have a leak detector which is simultaneously attached at the bottom end, while movable at the top end is not taught or suggested in the combination of references. Rather, the references disclose leak detectors which are either unattached or attached, but not a simultaneous combination of both structural configurations at either end, respectively.

In order to emphasize this aspect of the invention, Applicants amend claim 16, and respectfully submit that the prior art, whether taken alone or in combination, fails to teach or suggest the claimed subject matter.

Moreover, the amendments to claim 16 are fully supported by the specification. The “flow path portion” is clarified to the “flow path capillary”, and this structure is used throughout the specification (pages 16-17, for example).

Claim 24

Claim 24 is rejected as being anticipated by Applicants' admitted prior art. Applicants respectfully request the Examiner to reconsider and withdraw this rejection in view of the following comments.

The leak detector (31) includes a liquid retaining portion (14) including a space (SP1) configured to retain liquid flown into the leak detector, the liquid flown being a part of the liquid in the tank; a flow-rate measuring unit (13 or 33) which includes (A) a flow path capillary (13b or 33b) through which the space communicates with an interior of the tank and through which the liquid flows in and out, wherein the flow rate measuring unit is configured to measure an amount of the liquid flowing inside the flow path capillary and (B) a flow path opening/closing unit (34) configured to open and close at least one end of the flow path capillary and which is located at the at least one end of the flow path capillary; and a calibrating unit (37) configured to calibrate the flow-rate measuring unit under a closing operation of the flow path opening/closing unit.

The Applicants' cited prior art fails to disclose such a flow-rate measuring unit wherein its flow path opening/closing unit is located at one end of its flow path capillary. The alleged ventilating path 112a is not located at one end of the flow path portion, wherein the Examiner defines the flow path portion to be "located at the bottom of the detector 110 allowing the fluid from the tank to flow in to the space of detector 110 through measurement unit 111" (page 2 of Office Action).

Moreover, the amendments emphasize the structural relationship of the flow path capillary being a part of the flow-rate measuring unit, as illustrated in FIGS. 3, 9, 11 and 16.

Moreover, the amendments clarify that the flow path opening/closing unit is closely related to the calibrating unit in that the calibration accuracy is raised by stopping the liquid flow in the flow path capillary by means of the flow path opening/closing unit.

For at least the foregoing reasons, Applicants respectfully submit that claim 24 is patentable over the cited art.

Claim 28

Claim 28 is patentable for at least the same reasons as claim 16 discussed above. Namely, the combination of the cited prior art references fails to teach or suggest, whether taken alone or in combination, the structural configuration in which the upper end of the leak detector is simultaneously movable relatively to the top plate in a direction substantially perpendicular to the surface of the liquid while the bottom end of the leak detector is detachably attached to the bottom plate.

Taken as a whole, this structural configuration is completely lost with the combination of cited references. While the novel structure of the invention prevents false leak detection and other forms of erroneous measurements, by having one end of the leak detector movable simultaneously while the other end is fixed, the cited references fail to teach or suggest this concept or capability. Thus, claim 28 is patentable.

Claim 38

Claim 38 is patentable for similar reasons to those mentioned above regarding claim 24. Namely, in the claimed invention the flow path opening/closing unit is located at the end of the flow path portion.

None of the other cited references remedy this deficiency of the admitted prior art, and thus, claim 38 is patentable.

Claim 39

Claim 39 is patentable for similar reasons to claims 16 and 28. In particular, none of the cited references, whether taken alone or in combination, teach or suggest the structural configuration of having the upper end of the leak detector movable while the lower end is attached to the bottom plate. The combination of these structural features provides an improved capability of effective leak detection beyond that previously possible in the prior art.

Dependent Claims

The remaining rejections are directed to dependent claims. These claims are patentable for at least the same reasons as the independent claims, by virtue of their dependency therefrom.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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